

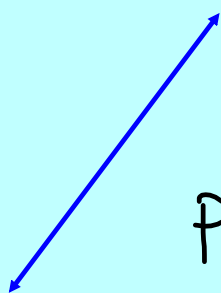
## UNIT 2 ANALYTIC GEOMETRY

2.1

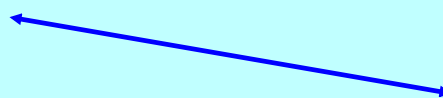
# L1- (Ch2 Getting Started) Slope & the Equation of a Line

What can you say about the slope of these lines?

a)

positive

b)



negative

c)

Slope = 0

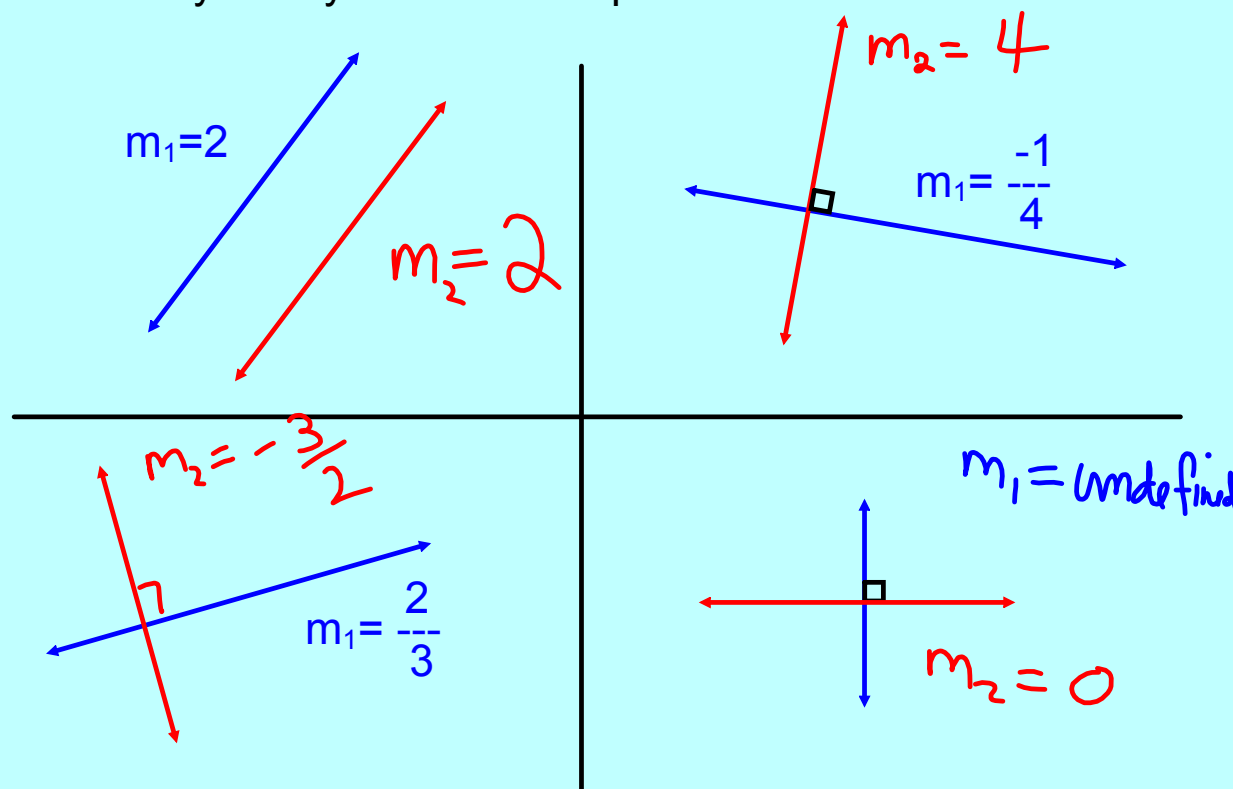


d)

undefined



What can you say about the slope of the red lines?



## Slope & the Equation of a Line

To write the equation of a line  $y = m x + b$ , we need

- slope ( $m$ )
- y-intercept ( $b$ )

- to calculate  $m$  (slope), we need two points:  
( $x_1, y_1$ ) and ( $x_2, y_2$ )

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{or} \quad \frac{\Delta y}{\Delta x} \quad \text{or} \quad \frac{\text{Rise}}{\text{Run}}$$

- to calculate  $b$  (y-intercept), substitute any point on the line back into the equation and solve for  $b$ .

NOTE:

**Vertical lines** are defined by the equation  $x = \#$ , and have an undefined slope.

**Horizontal lines** are defined by the equation  $y = \#$ , and have a slope of zero.

Ex.1 Determine the equation of the line:

(a) through (5, 1) and (7, -3).

 $x_1 \ y_1 \quad x_2 \ y_2$ 

$$y = \underline{m}x + \underline{b}$$

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{-3 - (1)}{7 - (5)} \\ &= \frac{-4}{2} \\ &= -2 \end{aligned}$$

$$\begin{aligned} y &= -2x + b \\ 1 &= -2(5) + b \\ 1 &= -10 + b \\ 1 + 10 &= b \\ 11 &= b \\ b &= 11 \end{aligned}$$

∴ the equation of the line is  $y = -2x + 11$

(b) through (2, 6) and parallel to  $y = 2x + 3$

$$y = 2x + b$$

$$6 = 2(2) + b$$

$$6 = 4 + b$$

$$6 - 4 = b$$

$$2 = b$$

$$b = 2$$

∴ the equation of the line is  $y = 2x + 2$

(c) through (2, 6) and perpendicular to  $y = 2x + 3$

$$m_{\perp} = -\frac{1}{2} \quad \text{sub in}$$

$$y = -\frac{1}{2}x + b$$

$$6 = -\frac{1}{2}(2) + b$$

$$6 = -\frac{2}{2} + b$$

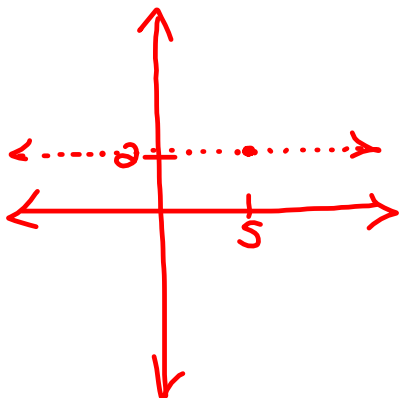
$$6 = -1 + b$$

$$6 + 1 = b$$

$$b = 7$$

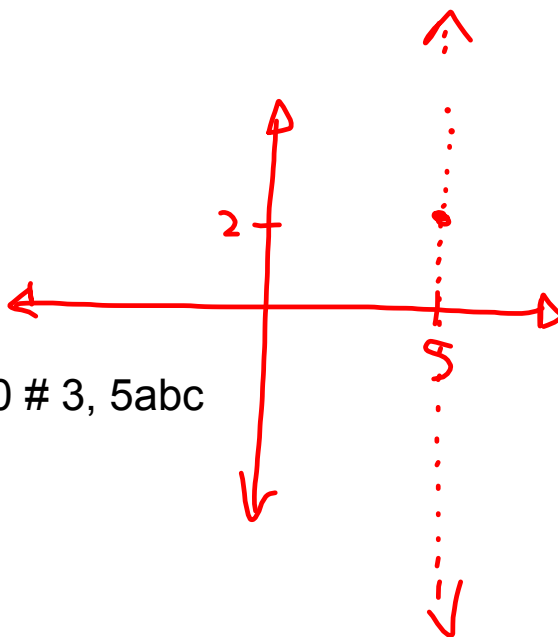
(d) through (5,2) with a slope of 0

$$y = 2$$



(e) through (5,2) with an undefined slope

$$x = 5$$



Assigned Work: Ch 2: p.69-70 # 3, 5abc

